Remarks

This Amendment is responsive to the Office Action dated January 4, 2006. Claims 1-8 remain for consideration.

1. Page 1 and 10 have been amended. However, the suggestion for page 6 is not deemed to be appropriate since, if such an amendment were made, the relative phrase would read "by adjusting the pressure differential between the water and the reactant gas on the order of 5 kPa...." That reading implies that the adjustment, rather than the result, is in the stated pressure range. It is requested that the required corrections be deemed to have been completed and the objection to the disclosure be withdrawn.

2,3. Claim 8 has been amended to correct a typo, and now depends from claim 7 as intended. Therefore, withdrawal of the -112 rejection is requested.

4,5. Claims 1 and 3 are rejected as anticipated by Cipollini. However, for anticipation, MPEP 2131 requires that the reference "teach every element of the claims." There are two elements of the claims which are not taught by Cipollini, and therefore preclude anticipation by Cipollini.

The first is that "said support plates are filled with coolant to about 50% - 80% of their coolant capacity." These limitations cannot be ignored. As stated at the bottom of page 4 of this application, Cipollini is not intended for use "at sub-freezing temperatures. If it were, the problem would be that with the substrates totally occluded with ice, the reactant gases could not reach the membrane, and therefore the fuel cell power plant could not be operated until water in the substrates was melted by some means other than operation of the fuel cell power plant to generate electric current."

On page 5, line 10 et seq. of this application, "the electrode support plate substrates of fuel cells are only partially filled with water...the partial filling (rather than totally filling) allowing the passage of reactant gases through the substrate...."

Cipollini only uses a single word to identify the amount of filling, and that word is "flood". Cipollini uses the word "inert" to be equivalent to purging reactant gases with an inert gas for the purpose of avoiding cell over voltage. In column 9, Cipollini refers to the fact that the "flooded region creates an immediate barrier between the MEA 16 and any remaining reactants....In this way, the fuel cell system 10 is promptly inerted by the protective barrier formed by the coolant in the flooded wettable substrates." Thus, the most careful reading of Cipollini comes up with only a single result, the substrates are filled with water. Indeed, they would not be a "barrier" nor would they protect the fuel cells from reactants, if they were not completely full.

Claim 1 also calls for "finally, draining water from the coolant passages." Cipollini does not suggest draining the coolant passages. At column 7, lines 64-67 Cipollini is not referring to draining the coolant passageways, but simply exhausting from the entire system any amount of water in the accumulator in excess of that permitted by the level sensor 76 and the controller 54. This is during normal operation and only causes removal of excess water, which is required because the fuel cell process creates water. This reference to draining excess cooling water has nothing to do with the final element of claim 1. Cipollini does not suggest draining water from the coolant channels as the final step of a shut down procedure; instead, he suggests draining excess water from the accumulator during normal operation.

In the start up process, referred to at column 10 after line 38, Cipollini refers to starting the water pump, but that is for the purpose of creating "a circulating flow of coolant water at substantially ambient pressure", and then after the anode reactant flow field is purged with fuel, either increasing the reactant gas pressure or "decreasing the coolant flow pressure, to establish the operating pressure differential...that un-floods the wettable substrates 22, 26 and the reactant flow fields 38, 48 and maintains them un-flooded during normal on load operation." There is no statement that without starting the pump there would not

be water in the coolant channels. With absolutely no reference to draining the coolant channels, this element of claims 1 and 3 is not present in Cipollini, and Cipollini therefore does not anticipate.

Since Cipollini does not include two elements of claims 1 and 3, reconsideration and allowance of claims 1 and 3 over Cipollini is hereby respectfully requested.

6,7. Claims 1-6 and 8 are rejected as obvious over Cipollini. Claims 2-7 depend from claim 1 and are patentable for the same reasons as claim 1.

With respect to claims 1 and 2, Cipollini does not suggest filling the support plates "to about 50% of their coolant capacity" as suggested in the middle of page 5 of the rejection. Instead, Cipollini floods the wettable substrate so that "the fuel cell system 10 is promptly inerted by the protective barrier formed by the coolant in the flooded wettable substrates." That is, the substrates are filled, otherwise there would be no protection because the barrier would be incomplete. Nowhere does Cipollini suggest other than filling the substrates.

Furthermore, in the penultimate paragraph of page 5, the rejection states that Cipollini does not disclose...filled with coolant to about 50% - 80% of the coolant capacity" In this rejection, on the sixth line of page 6, the operative words are "to allow coolant to flood the wettable substrates". Flood means nothing less than creating a protective barrier; there is no suggestion anywhere that the substrates are other than totally filled.

The last sentence in the main paragraph on page 6 refers to the fact that the hardware is the same. The hardware is not being claimed. The hardware can be operated in different ways. This application states (page 6, line 10) "The pressure differential required to create a particular level of saturation of the substrates with water is dependent upon the pore size distribution of the substrate. One skilled in the art can determine the percent saturation of the substrate with water, as a function of the gas-to-water pressure differential, by physical measurements of the hydrophilic substrate." The conclusion of the rejection of

claim 1, in the last paragraph on page 6, is not supported by evidence: there is no disclosure in the rejection as to what would suggest a pressure adjustment to achieve 50% - 80% of coolant capacity, nor is there any motivation in Cipollini to make that change (MPEP 2143, 2143.03). Cipollini does not suggest the desirability of the modification (MPEP 2143.01 I.). That Cipollini could be modified and operate this way is not sufficient to establish obviousness (MPEP 2143.01 III). Without the teachings of the present invention, the skill of the artisan would be to no avail (MPEP 2143.01 IV). Modifying Cipollini to be as set forth in claim 1 would render Cipollini unsatisfactory for its intended purpose (MPEP 2143.01 V) which is to block the reactant gases during the transition of shut down or start up. Certainly, only partially filling the support plates with water would change the principle of operation of Cipollini, which is to "flood" the support plates with water so as to provide a "protective barrier formed by the coolant in the flooded wettable substrates." MPEP 2143 requires "first, there must be some suggestion or motivation either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference.... Finally, the prior art reference...must teach or suggest all the claim limitations....The teaching or suggestion...and the reasonable expectation of success must both be found in the prior art, not in applicants' disclosure." With respect to claim 2, Cipollini does not teach filling with coolant "to about 70% of the coolant capacity." Although a skilled artisan could do it, there is no suggestion, no motivation as described with respect to claim 1 hereinbefore.

With respect to claim 3, having a similar pressures does not mean that the invention is obvious. For instance, the pressures of 5kPa - 6kPa is a specific range of pressure which for 30 microns has the amazing result of causing the water to be on the order of 60% - 80% of the substrate's capacity. That in turn has the wonderful result of allowing startup after being frozen, none of which is given any consideration whatsoever in Cipollini. Stated alternatively, the fact that the ranges may be similar does not detract from the fact that "The pressure differential

required to create a particular level of saturation of the substrates"....can be determined..."as a function of the gas-to-water pressure differential, by physical measurements of the hydrophilic substrate." Once more, there is no evidence in Cipollini to suggest that anyone would want to so carefully limit the pressure that the substrates would have some water, as required in the claims, but would not be "flooded" with water so as to prevent reactants from flowing therethrough.

With respect to claims 4-6, there are recited specific pressures which achieve a result different than Cipollini's, which result is beneficial. The invention of claims 4-6 is therefore not obvious. MPEP 2144.05 II. B. indicates that unless the prior art recognizes filled substrates "to be a result-effective variable", determining an optimum pressure to achieve that would not be "characterized as routine experimentation". The invention as a whole in this case is totally contrary to the teachings of Cipollini and is therefore not obvious, as is clear by reference to MPEP 2141.02 I. Furthermore, discovering the problem (i.e., can't start up with frozen support plates) **IS PART OF "AS A WHOLE" INQUIRY** MPEP 2141.02 III.

With respect to claim 8, see also the response in paragraph 8, hereinbelow. The allegation on page 8 in the rejection of claim 8 is incorrect. Cipollini teaches that both substrates are wettable (hydrophilic) in column 4, lines 34-37. All the references to the MPEP hereinbefore with respect to modification are apposite here.

For all of the foregoing reasons, reconsideration and allowance of claims 1-6 and 8 is requested.

8. Claim 7 is rejected as obvious over Cipollini in view of Fredley.

Fredley teaches away from the invention since he teaches that "the hydrophobic pores are coated with a hydrophobic substance and include about 75% to about 95% of the total pore volume of the porous support layer, and the hydrophilic pores comprise about 25% to about 5% of the total pore volume...." (center of Abstract). In column 4, Fredley refers to filling 5-25% of the pore volume with a blocking material such as liquid wax so that the hydrophobic substance will not be in that percentage; the hydrophilic percentage will be

between 5% and 25%. That teaching is repeated in column 8, lines 36-44. The Examiner's assertion at the bottom of page 8 that Cipollini does not teach it is correct. Since Fredley teaches away from the invention, reconsideration and allowance of claims 7 and 8 over the references is hereby requested.

Should the foregoing not be persuasive, a telephone interview is earnestly solicited.

Respectfully submitted,

M. P. Williams
Attorney of Record
Voice: 860-649-0305
Fax: 860-649-1385
Email: mw@melpat.com

210 Main Street
Manchester, CT 06042

Date: March 1, 2006